



## **Deployment of Alternative Fuel Vehicles - Greenhouse Gas Reductions**

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## NETL projects for Low-emissions Transportation Options

- **Clean Cities activities within US**
  - Pennsylvania-West Virginia regional corridor
  - Psychographic study of decision parameters
- **Clean Fuels programs**
  - Gas-to-Liquids
  - Hydrogen from Fossil Fuels
- **International program**
  - Clean liquids fuels collaborations with Canada and Peoples Republic of China
  - Evaluation of GHG reduction benefits in NGV applications



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# NETL Support for Transportation-Related GHG Reduction Projects

- **Analytical support**
  - Resource guide on estimating GHG benefits from NGV projects
- **Training activities to promote project development**
  - Training on developing GHG emission reduction projects using Clean Cities technologies (6th National Clean Cities Conference, May 2000)
  - Workshop for Chilean government representatives (1999)
- **Review of protocols for estimating project-level GHG benefits**



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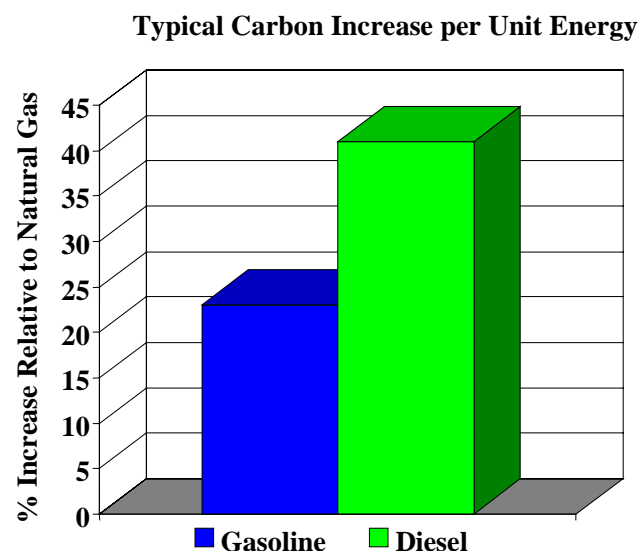
# **GHG Emissions and NGVs: NETL Resource Guide on Project Development**

- **Objective: Guidance for estimating project-level GHG emissions for participation in future market-based GHG reduction initiatives**
- **Includes guidance on:**
  - NGV technology and availability
  - Policies affecting NGV deployment
  - Literature review and NGV/GHG projects
  - Criteria for GHG reduction projects
  - Case study on estimating emission benefits from CNG taxi project
  - Future of alternative fuels



## Resource Guide: NGVs and GHG Emissions

- **Significant CO<sub>2</sub> advantage**
  - For similar engine efficiencies NG has 20-40% tailpipe advantage versus conventional fossil fuels
- **High methane content offsets CO<sub>2</sub> advantage**
  - Global warming potential (GWP) of methane = 21
- **Emission baselines must account for both CO<sub>2</sub> and CH<sub>4</sub>**



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## Resource Guide: Issues in Emissions Accounting

- **Determine project boundary**
  - Tailpipe evaluation typically represents 75% of total GHGs from gasoline, diesel, and NGVs
  - Full fuel cycle analysis more comprehensive, adds complexity
  - Protocols needed for determining project boundaries
- **Evaluate project additionality**
- **Other project impacts**
- **Case study provides 3 baselines to illustrate different options**



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# Resource Guide: Recommendations

- **To facilitate project development, guidance needed on:**
  - Estimating emissions from dispersed emission sources
  - Determining project boundaries
  - Relevant emission sources
  - Monitoring, verifying, and certifying reductions



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## **Clean Fuels**

- **Issues facing transportation sector include increasing impacts of urban pollution, increasing emissions of greenhouse gases, and long-term availability of liquid fuels from petroleum.**
- **The Transportation Fuels & Chemicals program at NETL develops technologies to mitigate environmental, economic and energy security issues associated with maintaining a liquid fuels infrastructure in the U.S.**
- **Promotes environmental quality by providing the technical bases for ultra-clean transportation fuels, coal-biomass fuels and fuel feedstocks, hydrogen production and separation technologies, reduced sulfur fuels, and systems that would allow closure of the carbon cycle**





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## Clean Fuels

- **Gas-to-Liquids focuses on means to convert remote natural gas to stable, environmentally attractive liquid fuels that are easy to ship to market.**
  - Reducing costs of making the syngas intermediate needed for Fischer-Tropsch chemical synthesis to zero-sulfur, zero-aromatic diesel and naphtha liquids, using ceramic membranes, plasma, and other technology.
  - Effecting steady-state, catalytic methane oxidation to higher hydrocarbons using hydrogen- removal membranes.
- **Work in advancing technology for small-scale physical conversion of gas to LNG to enable economic transport of small gas volumes from remote wells without expensive pipeline investment.**
  - Harnessing heat-generated sound waves to power LNG refrigeration without needs for electricity or compressors.



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# Summary

- **NETL activities focus on infrastructure issues associated with natural gas vehicles**
- **International outreach to encourage use of NGV's outside US where multiple environmental benefits can be achieved**
- **Supporting and performing R&D related to clean liquid fuels from remote gas and from a range of solid feedstocks**

